Certificate of Translation

I, Andrew Davis, c/o Patent Attorneys Lippert, Stachow & Partners, Frankenforster Strasse 135-137, D-51427 Bergisch Gladbach, Federal Republic of Germany, do solemnly and sincerely declare that I am conversant with the English and German languages and a competent translator thereof, and that the following is a true and correct translation into the English language of International Patent Application No. PCT/DE2005/000319.

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Massage arm

The invention relates to a massage arm, comprising a massage element, for a massage unit that can be incorporated into a massage chair or similar, where said massage arm is hinged on at least one shaft that can be moved by a drive in the massage unit and has an articulated connection to the massage element.

Various embodiments of massage arms of this kind are known. The massage unit customarily consists of a massage carriage, which can be incorporated into the backrest of a massage chair, or into another item of furniture to be equipped with a massage unit, and can be moved back and forth along a frame by means of a drive. As a rule, the massage carriage displays two motor-driven shafts, via which oscillation of two massage arms, each provided with a massage element, is generated. To this end, each massage arm expediently consists of a holding arm, connected in articulated fashion to the one shaft, on the free end of which the massage element is located, and a projecting arm, connected in articulated fashion to the second shaft, one end of which acts on the holding arm. To generate the oscillation, the ends of both shafts can display eccentric areas, on which the holding arm and the projecting arm are mounted. In this context, the eccentric areas at the ends of the shaft connected to the holding arm can be angled relative to this shaft, such that, when this shaft rotates, the holding arms bearing the massage elements perform a pivoting movement about an essentially horizontal axis extending through the intersection of the shaft in question and the angled axis of the eccentric areas. The massaging action generated by this movement of the massage elements is referred to as "kneading".

The movement of the shaft connected to the projecting arm is such that, when superimposed on the eccentric oscillation of the shaft connected to the holding arms, essentially vertical movement of the massage elements is generated via the projecting arms, possibly with a component oriented perpendicular to the frame. The massaging action exerted by this movement is also referred to as "tapping".

Massage arms of this kind are known from WO 97/37627, for example. The roller-shaped massage elements located on the holding arms can be rotated about an essentially horizontally oriented axis.

On other known massage arms, the massage elements are of flat or hand-shaped design, and act on the back of the person sitting in the massage chair or similar through several attached massage bodies. In these embodiments, too, the massage elements are located on the holding arms in a manner permitting pivoting about an essentially horizontal axis. Other connections between the massage elements and the holding arms use two axial directions.

However, it has become apparent that the massaging action of all these known massage arms with massage elements connected to them in articulated fashion is not optimum.

The object of the present invention is to further develop massage arms with attached massage elements in such a way that an improved massaging action is achieved with them.

According to the invention, the object is solved in that, on a massage arm with a massage element of the kind described in the opening paragraph, the articulated connection between the massage arm and the massage element comprises a ball-and-socket joint.

It has been found that use of a ball-and-socket joint as the connection between the massage arm and the massage element results in more effective transmission of forces directly to the back of the person sitting in the massage chair or similar, and that the massaging action can thus be substantially improved.

In an expedient embodiment, the ball-and-socket joint displays a ball head, located on the end of the massage arm opposite the articulated connection to the shaft, which is mounted in a ball socket located on the massage element.

In the customary design of the massage arms, described above, with a holding arm for the massage element that is moved by a first shaft, and a projecting arm acting on the holding arm and moved by a second shaft, the ball head is located rigidly on the free end of the holding arm.

However, the ball head can also be connected to the massage element and mounted in a ball socket located on the massage arm.

In a preferred development of the invention, the ball head displays two opposite pins, which engage opposite openings in the ball socket. This measure restricts the freedom of rotary movement between the ball head and the ball socket in motion planes in which the axial connection between the openings lies.

In particular, the openings can be of elongated design towards the edge of the ball socket, such that the pivoting angle of the ball-and-socket joint in the plane in which the two longitudinal axes of the openings lie is restricted to a predetermined range. This prevents rotation of the massage elements in this plane.

The two longitudinal axes of the openings preferably extend essentially in the longitudinal direction of the massage arm, and particularly of the holding arm if the massage arm consists of a holding arm connected to a first driven shaft and a projecting arm acting on said holding arm and connected to a second driven shaft. The openings are then located parallel to the plane formed by the holding arm and the projecting arm, such that the massage element can only rotate perpendicular to this plane within limits.

If the massage element is only to pivot within limits in the plane containing the longitudinal directions of the two openings, the width of the openings perpendicular to their longitudinal axes is designed such that it essentially corresponds to the diameter of the pins.

Particularly if the massage arms are located in the backrest of a massage chair, they extend, when the backrest is upright, in a direction that is essentially horizontal to the back of the person sitting in the massage chair. The elongated openings in the ball socket then restrict pivoting of the massage elements about their vertical axis, thus preventing rotation about this axis.

For folding in the massage arm relative to the massage element, provision can be made for the ball head to display an extension projecting beyond the ball socket for connection to the massage arm, and for the ball socket to be provided with a U-shaped groove that is open towards the edge of the ball socket and into which the extension can be pivoted.

In a preferred embodiment, the massage element displays a supporting part, with massage bodies for acting on the human body located on one side of the supporting part, where the supporting part consists of two halves, on each of which one half of the ball socket is integrally molded in one piece on

the side of the supporting part opposite the massage bodies.

The supporting part halves and the ball socket halves integrally molded thereon are expediently designed as plastic parts, injection-molded in one piece.

A practical example of the invention is explained in more detail below on the basis of the drawing. The Figures show the following:

Fig. 1 A perspective representation of a massage arm, with an attached massage element,

Fig. 2 A side view of the massage arm with massage element illustrated in Fig. 1, and

Fig. 3 A front view of the massage arm with massage element illustrated in Fig. 1.

In the practical example of a massage arm 1 with a massage element 2 illustrated in the drawing, massage arm 1 is connected to massage element 2 by a kind of spherical cardan joint 3.

The drawing shows only holding arm 4 of massage arm 1, said holding arm 4 being freely mounted in a bearing arrangement 5 on a motor-driven shaft not shown in the drawing. Mounting is performed on an eccentric end of the shaft that is arranged at an angle relative to the shaft in a direction such that both eccentric oscillation of holding arm 4 parallel to the drawing plane of Fig. 2 is generated, and also pivoting of holding arm 4 perpendicular to the drawing plane of Fig. 2.

Hinged on the middle section of holding arm 4 is a projecting arm, not shown in the drawing, which has an articulated connection to a second shaft, likewise not shown in the

drawing. Via the motor-driven movement of the second shaft, an oscillating movement is likewise generated in the projecting arm and, via it, in holding arm 4, said oscillating movement running essentially parallel to massage element 2, possibly with a component perpendicular to massage element 2. When superimposed on the eccentric movement of holding arm 4, this oscillating movement leads to so-called "tapping" motion, whereas pivoting of holding arm 4 essentially in the vertical plane perpendicular to the drawing plane of Fig. 2 causes so-called "kneading" motion.

As can likewise be seen from the drawing, massage element 2 consists of a flat, hand-shaped supporting part 6, with massage bodies for acting on the human body located on the side opposite holding arm 4. Corresponding openings 8 are provided in supporting part 6 to accommodate the roughly hemispherical massage bodies 7. Four massage bodies 7 are provided in the practical example illustrated in the drawing. Their shape and number can, of course, be selected in accordance with the respective requirements.

As can be seen from the drawing, spherical cardan joint 3 connecting massage arm 1 to massage element 2 consists of a ball head 9, located on the end of holding arm 4 opposite articulated connection 5, and a ball socket 10, integrally molded on the side of supporting part 6 opposite massage bodies 7. Ball head 9 is connected to holding arm 4 via a cylindrical extension 11.

Ball head 9 displays two opposite pins 12, which extend perpendicular to the massage arm and engage opposite openings 13 in ball socket 10. Pins 12 and openings 13 prevent rotation of massage element 2 about the axis of cylindrical extension 11 of ball head 9.

Openings 13 are of elongated design in the axial direction of

cylindrical extension 11 of ball head 9, such that the pivoting angle of the articulated connection between massage arm 1 and massage element 2 in the vertical plane perpendicular to the drawing plane of Fig. 2 is restricted to a predetermined range. This prevents rotation of massage element 2 in this plane.

As can be seen particularly from Figs. 1 and 3, ball socket 10 is provided with a U-shaped groove 14 that is open towards the edge of ball socket 10 and into which cylindrical extension 11 of ball head 9 can be pivoted. Groove 14 is located in the plane of massage arm 1 parallel to the drawing plane of Fig. 2 and perpendicular to the drawing plane of Fig. 3, such that massage arm 1 can be folded in relative to massage element 2 in this plane.

Supporting part 6 of massage element 2 is (not shown in the drawing) made up of two halves, on the parting line of each of which one half of ball socket 10 is integrally molded in one piece, such that ball head 9 of massage arm 3 can be accommodated between the ball socket halves. The supporting part halves with the integrally molded ball socket halves are connected to each other by suitable fastening means.

The supporting part halves and the ball socket halves integrally molded thereon are in each case designed as plastic parts, injection-molded in one piece.

Massage arm

1	Massage arm
2	Massage element
3	Spherical cardan joint
4	Holding arm
5	Bearing arrangement
6	Supporting part
7	Massage body
8	Opening
9	Ball head
10	Ball socket
11	Extension
12	Pin
13	Opening
14	U-shaped groove